Quarterly Progress Report
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Period of Report: July 2013, through October 2013.

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Introduction
The debris mitigation project goals are to:
(1) Develop a test debris mitigation platform that will allow us to test various debris mitigation technologies and methods. (completed)
(2) Prepare the Nenana test site infrastructure (e.g., anchoring/mooring system) to be able to accommodate the debris mitigation platform tests (completed) and possibly retest the New Energy Turbine, as appropriate (Cost estimates to refurbish the New Energy Turbine and our work on debris testing indicates that it is beyond the scope of this project).
(3) Obtain necessary permits and conduct the necessary baseline studies to prepare for the debris mitigation testing. (completed)
(4) Conduct the debris mitigation technology and debris management methods testing (completed).

Refer to previous quarterly reports for a general description of the project and activities to-date. Previous quarterly reports were submitted on 10/15/2011, 1/16/2012, 4/3/2012, 7/24/2012, 10/18/2012, 1/15/2012, 4/27/2013, and 7/24/2013.

Activities and Progress
From July through October we have completed analysis of the hydrodynamic conditions behind the Research Debris Diversion Platform (RDDP) and compiled the results from our log deflection tests (which have been described in previous quarterly reports) on the RDDP. We continue to analyze the video images of the log deflection tests and are compiling the information needed for the final report.

Flow field turbulence in the wake of the RDDP
A preliminary examination of the flow field and turbulence in the wake of the research debris diversion platform (RDDP) was conducted to determine what

effects the RDDP has on the available kinetic energy behind the RDDP. In a preliminary write-up, H. Toniolo concluded that cross-river acoustic Doppler current profiler (ADCP) transects were unable to detect changes due to the introduction of the RDDP and that the large, natural variability of the river flow masked any signal of the RDDP's wake in such cross-river transects. In contrast, a similarly qualitative analysis concluded that quasi-stationary ADCP measurements (Figure 1) were able to detect a reduction in the northward directed near surface velocities (Figure 2) as well as an increase in the westward directed near surface velocities in the RDDP's wake. These changes were attributed to the presence of the RDDP. Changes in river flow direction were negligible several meters distant from the RDDP. These conclusions are preliminary and are a qualitative characterization of the effects of the RDDP on the river flow field. Changes in the river flow field behind the RDDP, using additional quasi-stationary measurements and alternate analyses of the cross-river transects, are the subject of a continuing measurement campaign and analysis.

Figure 1. Quasi-stationary velocity measurement locations. Flow direction is from right to left.
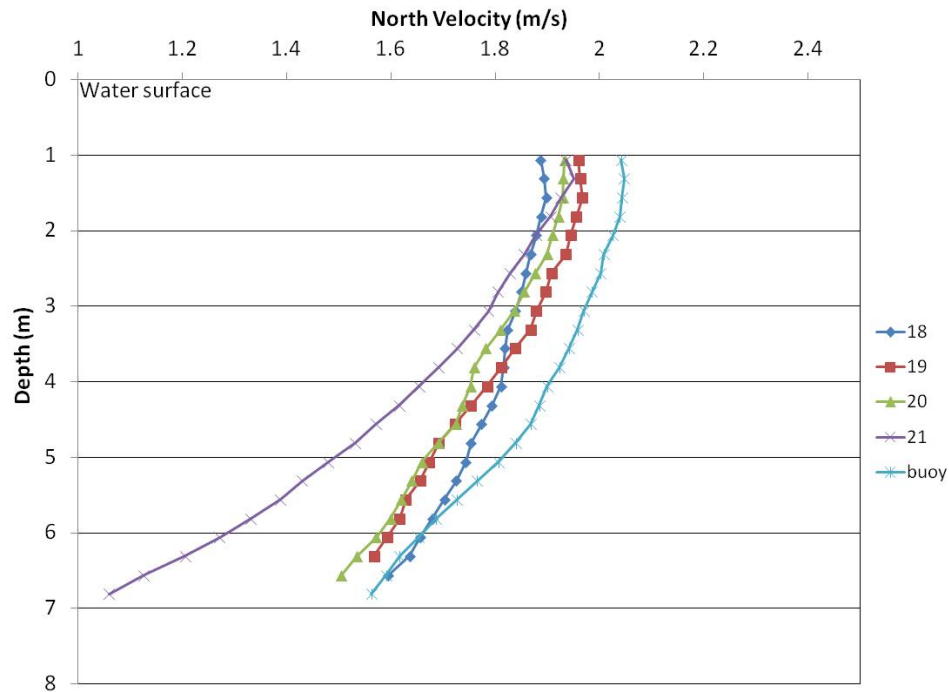
Figure 2. Average velocity in the north direction at different measurement locations.

RDDP field deployment activity log

The RDDP deployment activity log provides a daily record of activities that were conducted at the Tanana River Hydrokinetic Test Site (TRHTS). This information is used to assess the effectiveness of the RDDP at diverting debris as a function of RDDP deployment angle and The parameters are:

1. Activity date
2. Whether or not debris diversion test activities were conducted
3. Whether the 2 or 20 klbf load cell was engaged
4. Notes of what occurred during the activity
5. The length of the mooring line between the RDDP and the mooring bouy
6. The hydraulic ram extension. The ram is used to vary the RDDP angle between the pontoons.
7. The angle between the RDDP pontoons
8. The swept area of the RDDP for the stated angle of opening in the river.

Table 1. RDDP deployment activity log

RDDP deployment 2012	debris ops	2 Klb loadcell	20klb loadcell	notes	mooring line	ram extension (m)	angle between pontoons (degrees)	swept width (m)
7/9/12 10:03		X		deploy RDDPwith 2k lb load cell	short (18 m)	closed	25	3.2
7/11/12 15:30				remove RDDP from mooring				
7/16/12 20:32		X		deploy RDDPwith 2k lb load cell	short (18 m)	closed	25	3.2
7/18/12 10:30				remove RDDP from mooring				
7/26/12 21:39		X		deploy RDDP with 2k lb load cell	long (80m)			
7/27/12 13:18	X	X		2k load cell link parted from load of introduced debris	long (80m)			
7/27/12 18:00				left RDDP on long mooring	long (80m)			
8/1/12				transport RDDP front frame to fairbanks for front frame modification				
8/9/12				reassemble RDDP after mods				
8/14/12	X	X		deploy RDDP with both load cells	long (80m)			
8/15/12 17:30		X		expand RDDP	long (80m)			
8/15/12 19:45		X		close RDDP	long (80m)	0.00	25	3.2
8/16/12 11:21	X	X		Open RDDP from closed config	long (80m)	0.28	36	4.2
8/16/12 15:27	X	X		Expand RDDP to full open	long (80m)	1.20	74	7.3
8/16/2012	X	X		retract RDDP to closed config at end of day	long (80m)	0.00	25	3.2
8/22/12 17:25				remove RDDP from buoy				
8/23/12 14:20		X		deploy RDDP	short (18 m)	0.00	25	3.2
8/23/12 16:45		X		expand RDDP	short (18 m)	1.20	75	7.3
8/23/12 18:30		X		close RDDP & remove from mooring				
8/24/12	X	X			long (80m)	1.26	77	7.3
8/24/12	X	X			long (80m)	0.80	58	5.9
8/24/12	X	X			long (80m)	1.00	66	6.5
8/28/12 12:30				remove RDDP from mooring to remove spinner & replace with fixed "nose"				
8/28/12 19:40	X	X		moor RDDP to buoy	short (18 m)			
9/6/12 12:30	X	X		switch to long mooring line	long (80m)	0.00	25	3.2
9/6/12 15:09	X	X		expand RDDP to max	long (80m)	1.20	75	7.3
9/6/12 17:00	X	X		close RDDP to min	long (80m)	0.00	25	3.2
9/6/12 19:00		X		change to short mooring	short (18 m)	0.00	25	3.2
9/13/12 11:00				remove RDDP from mooring to demobilize for season				

Planned activities for the next quarter
During the next quarter we will finish analyzing the video data to ascertain the processes of debris diversion and behavior. We will also complete the project final report.